

The Zollverein, or how to sequence a Customs Union

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1 Introduction

In the 1830's a number of German states established the Zollverein, a customs union which according to Jacob Viner " [...] was the pioneer and by far the most important customs union, and generalizations about the origin, nature, and consequences of unification of tariffs tend to be based mainly or wholly on the German experience". One area, where the case of the Zollverein has not been used as an example is the question of Regionalism and sequencing of trade agreements. One of the major debates about modern trade institutions is the question whether regional trade agreements are a help or a hindrance to attain global free trade. Another neglected aspect of this debate is the order in which regional agreements form. I will use the historical case of the Zollverein to investigate the reasons behind the observed structure of regional agreements, their effects on the attainment of free trade as well as the choice of a sequential, regional agreements approach over multilateral negotiations. After introducing the history of the Zollverein and its historical context in the second section, I review the relevant literature in the third section. In the fourth section I introduce a game-theoretical model which serves as a framework for the analysis. The application to the actual sequence is described in section five with section six concluding.

2 Historical context

Napoleon caused the a complete change in the structure of german states, the old empire with hundreds of sovereign principalities was swept away and replaced by predominantly a few mid-sized states, as well as the larger powers of Austria and Prussia. The congress of Vienna was convened after Napoleon's defeat and redrew the map of Germany again. It created a mixture of states, from independent cities (Frankfurt, Bremen, Hamburg, Luebeck) over small principalities (especially in Thuringia) to mid-sized states (Bavaria, Baden, Wuerttemberg, Saxony,etc) and the two leading states, Prussia and Austria. The political governance structure in most cases was transitional from an absolutistic monarchy to a constitutional monarchy. Constitutions were introduced in many states, parliaments gained power but were mostly far from being really decisive.(Cite)

2.1 Deutscher Bund

The Congress of Vienna also established the "Deutsche Bund", the German Union. This political organization had a regular congress in Frankfurt, the Bundesversammlung, to which each german state send an representative, who was given a certain number of votes, depending on the size of the state. Under the guidance of its presidial power Austria the Bund limited itself to a very perfunctory role. Although its constitution contained an article about furthering economic cooperation between its member states, did initial negotiations not gain much traction and were later fully abandoned.

2.2 Prussia's customs law

The complex legal and governance rights of all the different german sovereignties before the Napoleonic wars was also reflected in the myriad of customs and tariffs levied. After the Rheinbund brought a first clearing, faced the new states after 1815 huge financial costs due to war time expenditures. One revenue source they turned to was tariffs, leading to a resurgence of tariff barriers throughout Germany. The barriers however were not predominantly external, but often internal. For example Prussia had 57 internal tariff lines. After experiencing defeat against France in 1806, Prussia turned a modernization and reform policy to strengthen its position. This policy also led to the development of a new customs law. As detailed by Ohnishi, Prussia was

fostering economic development through the removal of internal tariff lines but also had the strong intention to increase its tariff revenues. The government also saw the need to balance the expectations and wishes of the two disjoint parts of its country. The west, where manufacturing was comparatively strong asked for more protectionistic policies, whereas the predominantly agrarian east was interested in low tariffs, mostly to increase its chances for low tariffs on its exports into foreign countries, especially Britain. The resulting tariff had relatively modest rates, balancing free trade and protectionistic tendencies and was raising substantial revenues.

2.3 Zollverein

2.3.1 History

After Prussia reformed its tariff laws in 1818, it began to put pressure on enclaves within its territories to join its system. It had some success over the next years, but some states, especially Anhalt-Koethen refused to preserve its full sovereignty. At the same time South German states began to negotiate about forming a customs union of their own, however talks were never concluded successfully, mostly due to disagreements over political controls as well as policy. Bavaria and Wuerttemberg decided to go ahead on their own and formed a customs union in 1828. Prussia as its first step was looking to connect its two separate territories. By doing so it also would achieve to have any trade route connecting Southern Germany, including the major trade fairs in Frankfurt and Leipzig, with the North sea ports. The two countries connecting the two prussian halves were Hannover and Hesse-Cassel (HC). Both weren't receptive for a connection with Prussia, the duke of Hesse-Cassel was at times even trying to leverage the geographic position of his country to lead a customs war against the Prussian tariff system. In 1828 Hesse-Darmstadt (HD) was inquiring with Prussia about a possible trade agreement and Prussia was seeing its chance. HD was convinced to join the Prussian tariff system, which led as a reaction to the formation of the Mitteldeutscher Handelsverein. In contrast to the previously formed two customs unions, was this agreement not a full union. The numerous member states, Saxony, the thuringian principalities, Hesse-Cassel, Nassau, Frankfurt, Braunschweig, Hannover, Bremen had different ideas how far the agreement should go, resulting in a minimal compromise. No state was to join one of the two customs unions, trade routes were to be improved and

preferential treatment was to be given to imports from other member states. The two customs unions reacted to that by starting negotiations and concluding a first trade agreement in 1829. Prussia then turned to break the Mitteldeutschen Handelsverein apart and in 1831 managed to convince HC to leave it and join the Prussian system instead. Prussia then resumed the negotiations with Bavaria and Wuerttemberg about a full merger of the two customs unions. These negotiations also had an effect on Saxony and the thuringian principalities, which managed to include a provision into the renewal treaty for the Mitteldeutschen Handelsverein, allowing them to defect if the two customs unions decided to unify. Knowing this Prussia opened negotiations with Saxony and the thuringian states, leading to a rapid conclusion with Saxony once negotiations with Bavaria and Wuerttemberg had come to positive end in march of 1833. Two months later also negotiations with the Thuringian principalities ended, which agreed to pool their membership and have one body, the "Thueringischer Zollverein", be the official member. The resulting customs union officially came into force on the first of January 1834 and was commonly referred to as the Zollverein. Negotiations between the Zollverein and Baden were now opened and concluded in May 1835. Negotiations with Nassau and Frankfurt drew out somewhat longer, with Nassau signing in December 1835 and Frankfurt officially agreeing with the beginning of 1836, which also was the official begin of the membership of these three states. After the breakdown of the Mitteldeutscher Handelsverein, two northern members, Braunschweig and Hannover formed a customs union on their own, the "Steuerverein", which Oldenburg joined two years later. In 1841 negotiations between the Zollverein and Braunschweig were opened, which led to Braunschweigs defection to the Zollverein in 1842. It took another decade, but in 1854 also Hannover and Oldenburg joined the Zollverein.

(A timeline and maps are given in the appendix)

2.3.2 Institutions

The Zollverein had basically two institutions, the permanent office which did the calculations and the Generalkonferenz, the congress of the member states, which was setting policy.

The permanent office was located in Berlin and its predominant function was to compile the relevant numbers for the revenue distribution scheme. There was no policy function for it.

The congress met in different capitals, settling on a three year rythm. Each full member-state was sending an official representative. Decisions had to be taken unanimously.

2.3.3 Regulations

Besides setting up the aforementioned institutions, the Zollverein had other regulations and programs.

One element was the regulation that states should treat citizens of other member states the same as its own with regard to fiscal and commercial rules.

Zollverein members levied different taxes on producers of certain consumption goods, like beer and wine. To balance the tax liabilities of domestic producers and exporters from other Zollverein member states, exporters had to pay the tax differential between its home state and the state the goods were destined for.

To ease the facilitation of tariff administration, the Zollverein states started to coordinate norms like weights and measurements. Two special congresses in 1837 and 1838 dealt with the issue of multiple currencies and created minting conventions.

The Zollverein did not create an united customs administration, each state was still responsible for its borders with foreign countries. To control the quality of the customs systems and improve the administrative efficiency, the states created a program to have administration officials serve in other states. Especially Prussia sent out officials, which led to enforcement improvements and an increasingly positive attitude towards Prussia within the bureaucracies of the other member states.

3 Literature

In the second half of the 19th century historiography focused on Prussia's hegemony. One particular influential interpretation was given by Treitschke who saw the Zollverein as a first step towards German unification under the enlightened guidance of the Prussian monarch. This nationalistic view saw the Zollverein as a move by Prussia to assert hegemony over Germany and push out Austria. This view was beginning to be challenged in the 20th

century, where for example Kitchen and Taylor argued that Prussia's motive were initially of economic nature and only became political later on. Murphy provides a differing political interpretation, arguing that the Zollverein was intended as a political bulwark against France (Murphy 1991). Another interpretation was introduced by Dumke (Dumke 1976,1994), who emphasized huge fiscal savings due to economies of scale in customs administration, leading to considerable financial gains for the participating states. His theory is commonly accepted in the current economic history literature (Williamson 2003, Alesina 2004)

3.1 Dumke's Thesis

Dumke's argument basically has two main points. First there are economies of scale in the provision of a customs administration. This was already recognized then as evident by a rule of thumb used by Ludwig Kuehne, a high-ranking Prussian civil servant (Kuehne 1836). This rule states that the ratio of border length to area is an approximation for the cost/revenue ratio. Dumke shows evidence that the actual ratios are corresponding to the predicted rate, leading to cases, especially of small states, where revenues equal administration costs. This implies that especially small states could expect to reap financial gains by joining the Zollverein, which had a ratio of approximately 0.13. Second he shows that there is an incentive for the rulers in political terms, since the Zollverein revenues were not controlled by the respective parliaments, but directly at the disposal of the government. This allowed the reigning princes to increase their try at containment of revolutionary tendencies by lowering revenue constraints. The states were facing the cost to build up a modern administrative system, especially after the creation of somewhat arbitrary states at the Congress of Vienna, as well as the comparatively higher administrative costs for small states itself.

3.1.1 Critique

Dumkes evidence for Kuehne's rule supports the economics of scale argument. Since the ratio usually decreases with the addition of more states, does this give evidence for the concept of gobal superadditivity which will be discussed later. His argument about the financial need however does fail to explain the strong resistance of certain states, embodied for example in the foundation of the Mitteldeutscher Handelsverein. It also fails to account for the refusal

of northern german states to join within the first years of the Zollverein. It further cannot explain the choice of sequential over multilateral negotiations as well as the observed sequence with which states join.

The second part of his argument about the importance of the Zollverein, especially the revenues, for the political survival of the sovereigns is credible. The issue however is whether this really explains the creation of the Zollverein or whether it is more of an argument explaining the institutional persistence of the Zollverein till the aftermath of the Prussian-Austrian war.

Another problem with his thesis is the assumption of the importance of the revenue motive with regard to tariff setting. Since it is likely that revenues played the main motives in organizing a coherent tariff system, it is by no means certain. I will later discuss alternative motives for tariff setting, for now the point is simply that a country with an explicit free trade intention for example will face a relative high revenue to cost ratio, since administrative costs are not proportional to the height of the revenues. It draws into doubt whether certain states were not able to raise extensive tariff revenues or whether this was just the observed effect of a conscious decision to not do so.

3.2 Theory about trading systems

Modern Trade theory usually investigates membership in trade agreements through two different approaches. The first sees membership as the way to overcome the prisoners dilemma of tariff setting in the presence of price setting (Bagwell Staiger). The second approach sees membership as a commitment device for the government which is maximizing a welfare function containing public welfare and its individual gain from following the wishes of individual sector lobby groups (Grossman Helpman). Both approaches have the underlying assumption that trade policy has either fully or at least partially the explicit goal of public welfare. These approaches are used by Aghion et al to demonstrate the existence of coalition externalities for modern economies. These two approaches are based predominantly on modern states, with predominantly democratic structures as well as considerable strong power of taxation. Both elements are not really fully applicable to the case of early 19th century statehood in Germany. As Dumke shows, German states rely considerably longer on direct taxation like tariffs than other european states, and despite the emergence of some democratic elements, the power of sovereigns is still strong. Nevertheless I will use the underlying ideas

behind the two approaches when I discuss the goals of tariff policy later on.

4 Model

Aghion, Antras and Helpman have recently developed a cooperative game theoretic approach to investigate free trade negotiations, especially the effects of regional trade agreements. They derive a bargaining model, which allows for multilateral negotiations as well as for a sequential structure, where the payoffs are based on an underlying cooperative transferable utility game. They investigate under which conditions negotiations will result in the attainment of global free trade. I apply their model to the negotiations creating and completing the Zollverein.

4.1 Specification

They conduct their analysis primarily in a three country case and generalize to more players in some extension. They start with three countries, a b and c, and pick one of them (c) to be the leader and agendasetter. The bargaining game results in a coalition structure which is a partition Γ of $\{a, b, c\}$. Any forming coalition is seen as a Free trade agreement, or in my interpretation as a customs union. The payoff for each coalition C in a resulting partition Γ is given by the value function $v(C, \Gamma)$ of the underlying cooperative game. This payoff is also gross of lump-sum transfers. The value function depends on the objective function of the players involved. Since Aghion et al use mainly aggregate welfare as the objective, is this not fully applicable to the historical circumstances of the Zollverein. I will later specify a more appropriate framework to determine the resulting payoffs.

The first stage of the bargaining game is the decision of the agenda-setter regarding the negotiation structure. It can either choose a multilateral approach, making simultaneous offers to all other countries, or a sequential approach, making an initial offer to only one or at most a subset of countries. If it decides to choose multilateral negotiations, each state is then weighing its received offer individually and is responding with a yes or no decision. If at least one state refuses to accept, the negotiations are a failure and no agreement is reached. The resulting outcome is therefore either $\Gamma = \langle \{abc\} \rangle$ or $\Gamma = \langle \{a\}\{b\}\{c\} \rangle$. If the agenda-setter decides to follow a sequential a new offer is only made once the recipients of all previous offers have made

a positive decision. If one state decides to reject an offer, the negotiations stop and the result is an agreement with all the countries which had accepted to join prior to this first rejection. So if for example c approaches a first, which accepts, and then receives rejection from b the resulting partition is $\Gamma = \langle \{ca\}\{b\} \rangle$. Under both negotiation structures does each offer consist of the possibility to join the agreement and a connected payoff, which may contain lump-sum transfers between states. These payoffs are also independent of any further states joining the agreement. The extensive form of the bargaining game is depicted in the appendix. To ease notation I follow Aghion et al and define a function describing gross payoffs.

$$W(j) \equiv v(j; \{a\}, \{b\}, \{c\}) \quad \forall \quad j = a, b, c$$

$$W_{kl} \equiv v(j; \{j\}, \{kl\}) \quad \forall \quad j, k, l = a, b, c \quad \text{and} \quad j \neq k, j \neq l, k \neq l$$

$$W(kl) \equiv v(kl; \{j\}, \{kl\}) \quad \forall \quad j, k, l = a, b, c \quad \text{and} \quad k \neq l, k \neq j, l \neq j$$

$$W(abc) \equiv v(abc; \{abc\})$$

So $W(j)$ is country j 's payoff if there is no agreement at all, $W_{kl}(j)$ is the payoff for country j if countries k and l form an agreement, $W(kl)$ is the joint payoff of the countries k and l , which formed a coalition and $W(abc)$ is the joint payoff of the grand coalition, when all states join in the trade agreement. Aghion et al define two concepts, which are given for the general case of multiple players, which play an important role.

Definition: Coalition externalities

There are positive coalition externalities in country j when $W_F(j) > W(j)$, negative coalition externalities, when $W_F(j) < W(j)$ and no coalition externalities when $W_F(j) = W(j)$ where F is a coalition of countries which does not include j .

Positive coalition externalities imply that one country profits from an agreement between other countries. Negative coalition externalities imply that the country loses due to an agreement between other states.

Definition: Grand-Coalition (GC) Superadditivity

There exists GC superadditivity if $v(C_G; (C_G)) > \sum_{C \in \Gamma} v(C; \Gamma)$ for every $\Gamma \neq (C_G)$. GC implies that the joint payoff of the Grand coalition is larger than the sum of the payoffs for any other coalition structure.

Aghion et al define GC superadditivity for games with many players in such

a way, that it is equivalent to the existence of a non-empty core for the underlying cooperative game.

4.2 Model results

Aghion et al show in their benchmark result, that if GC holds but no coalition externalities exist, the outcome is global free trade under both negotiations structures, the payoffs to individual countries are identical, and the agenda-setter therefore indifferent between both choices.

Introducing coalition externalities they find that the existence of GC still guarantees the outcome of free trade. However the payoffs to individual countries are no longer identical and the agenda-setter therefore no longer indifferent. In their three country setting the presence of negative coalition externalities in at least one of the follower countries is sufficient to have the agenda-setter choose sequential negotiations. This simple existence of negative coalition externalities in just one country is not sufficient in a setting with more than three countries, where the sum of all has to be negative.

They also examine cases in which GC no longer hold and find that under certain conditions sequential negotiations will lead to global free trade or otherwise to the formation of less than global agreements

5 Application

To apply the above outlined model to the case of the Zollverein I show that the made assumptions correspond to the prevailing conditions. The first issue is the applicability of the model to the case of a customs union and not just Free trade agreements. The set of countries involved is in the case of the Zollverein considerably smaller than the global level. I show that there is one country which occupies the role of the agenda-setter, which has the choice of sequential and multilateral negotiations. These are the main assumptions of the model, additionally I analyze the applicability of the concepts of Global superadditivity and coalition externalities.

5.1 Customs Union

Aghion et al derive their model for Free trade agreements, not directly for Customs Unions. They do note however that is applicable to those cases as

well. The model can cover the case of customs unions in general, since such unions are free trade agreements with the special provision of common tariff rates in all states. Additionally customs unions usually involve some kind of agreement about the distribution of tariff revenues. This fits the model nicely, because it equals a transferable utility game.

This raises the question, why almost all negotiations between German states at that time were about forming customs unions and not just Free Trade agreements. This also differentiates the unification process of the Zollverein from the trade negotiations between European States after the Cobden-Chevalier treaty. The reason for this differentiation is the importance of being able to enforce rules of origin regulations. Differences in tariff rates against third country producers can only be upheld if the enforcement of rules of origin regulations at the border is sufficiently strong. The relatively small size and complex interwoven geographical positions of German states allows for relatively cheap detours, so the savings through entering in the lower tariff rate FTA member state and then freely exporting into the higher tariff member state is easily outweighing the higher transport costs. This can be demonstrated using the trade agreement between Hesse-Darmstadt and Baden in 1823. Hessen being cash-strapped was running high tariffs for revenue purposes, Baden as a trading oriented nation had relatively low tariffs. Already one year later Hesse-Darmstadt cancelled the treaty due to complaints about smuggling and the inaction of Baden in this question. (quote) Free Trade agreements do not provide economies of scale for customs union administration, so their main effect is the economic benefit of trade improvements. Given the contemporary importance of revenues, do Free Trade agreements not guarantee superadditivity as easily as Customs union, explaining the choice of a Customs Union over a Free Trade agreement between the German states.

5.2 Geographical Scope

The current discussion about multilateral trading systems is the starting focus of Aghion et al and their framework is therefore global free trade. However I will use German states excluding Austria as the relevant set of players. I analyze why Austria and France, who could possibly serve as agenda-setter given the geographic situation, are not taking the role and why they as well as other states do not constitute players.

5.2.1 Austria

Austria had a predominantly passive stance towards the first state of negotiations conducted by German states. This was due to a policy of accommodation towards Prussia and internal pressure to uphold a prohibitive tariff system, which excludes economic cooperation. (Branchart 1930)

5.2.2 France

The French government was acting similar to its Austrian counterpart. Despite repeated letters from its Bavarian and German representatives, detailing the possibility to gain influence over German states through trade policy, did the French government not deviate from its high-tariff policy, angering possible allies in Germany. This stance also didn't change much though the July revolution in 1830 (Krauss 1987).

Both, France and Austria, had the potential due to their size and geographical location to become an agenda-setter for trade policy between German states. However both of them did not grasp the opportunity, likely due to their decision to prefer strong protection over possible gains from trade. Once Prussia had secured the first agreements with other German states, the role of the agenda-setter was filled, crowding out France and Austria from the process. These tried to counteract the Prussian politics, for example the French treaty with Nassau, but had neither the means nor enough political will to stop Prussia.

5.2.3 other nations

Denmark, the Netherlands and Switzerland are further neighbours. None of them had the size and economic power to be a potential agenda-setter. The Swiss got a guarantee of their absolute neutrality on the Congress of Vienna, so any sharing of sovereignty through the involvement in a customs union was not acceptable for them. Denmark owned the German principality of Holstein-Lauenburg, a member of the Deutsche Bund, but the Danish King preferred consistency of economic policy within his dominion over a possible membership in the Zollverein. Similar to Denmark, the Netherlands owned a principality, Luxemburg, which was considered to be German, i.e. a member of the Deutsche Bund. Luxemburg joined the Zollverein in 1842, due to political pressure. One of the fortresses of the Deutsche Bund was located there, which led the German states in the Zollverein to secure the adhesion

of Luxemburg, once France had floated plans about a customs union with them.

There do exist trade agreements between foreign nations and individual german states before their membership in the Zollverein, for example Nassau and France, Frankfurt and Britain, however I look at these not as possible customs unions but as tools for tariff policy. I analyze their role later in some more detail.

5.3 Agendasetter

The described model has a leading state deciding which negotiations will be conducted. In the case of the Zollverein Prussia is the obvious leading nation. This can be illustrated using a few historic episodes. For example Prussia refused negotiations offers from the Mitteldeutscher Handelsverein, but conducted individual negotiations with selected member states, for example Hesse-Cassel. Prussia also did not negotiate with Bavaria and Wuerttemberg about merging the customs unions until it had secured the accession of Hesse-Cassel to its system. Another point is the treatment of Hesse-Darmstadt by the Prussian government after they had agreed on a customs union. Prussia did not give them preferential treatment, nor did it really coordinate it's policy with them, it merely informed the Hessian government of its decisions.(Quotes) After the official creation of the Zollverein Prussia's lead was visible in the negotiations about the accession of further states, as well as in the relations between the Zollverein and foreign states. Those international negotiations were in most cases conducted by Prussia alone, and the results then submitted to all the Zollverein members for ratification.

Another indication for Prussia's role as agenda-setter is evident in the language used during the time. The discussion usually mentions the "Prussian system", not the Prussian-Hesse-Darmstadt system and the negotiations leading up to the creation of the Zollverein are mostly phrased about states joining the Prussian system, not about creating something new.

5.3.1 Prussian Motives

Given its role as the leading nation of the Zollverein, Prussia's motivation to pursue its creation and extension is relevant for the reasons driving the Zollverein. The Prussian Finance Minister Motz in a note to his colleague

Eichhorn about a report for the negotiations with Bavaria and Wuerttemberg argues as follows:

"In the report to his Majesty about a customs and trade treaty with Bavaria and Wuerttemberg the following conditions should be considered:

- 1. Political importance concerning our position in Germany*
- 2. Impact on the Mitteldeutschen Verein and Elimination of all its negative effects on Prussia.*
- 3. Financial and economic Advantage for Prussia*

I will further comment on 3. The following principles should be applied.

a. Free Trade in goods and manufactures of the combined states, conditional on the required security through certificates of origin, at most with the modification that full import and export tariffs are removed only after two to three years, for now reduced by half, but on the explicitly affirmed principle of complete free trade. Advantages are an increased market for larger domestic industry and especially for our far superior manufacturing, increased trade and in that respect especially import a better utilization of the Elbe through Magdeburg.

b. Through a possible accession of Rheinbayern to the hessian and prussian Zollverein besides the advantages of a also lower administrative costs through enlargement and better borders of the customs line."

His first point shows the fact that this customs union was not only an economics or fiscal undertaking, but had an explicit political intention. The political goals are varied and interwoven and include especially the desire to create a coherent Germany against France. It was no explicit aim to push Austria out of Germany, but the economic unification without Austria had a certain effect in this direction. The Zollverein also prevented the rise of third power in Germany besides Prussia and Austria. (Murphy 1991)

The second item illuminates the strategic thinking by the Prussian government about the use of externalities to forge the Zollverein. It shows that the Mitteldeutsche Verein was a negative reaction to mitigate externalities, and Prussia was actively working to further exert externalities.

The third point shows that there were financial goals. The explanation given highlights the expected positive effects of an increase in market size, the positive effect through an increase in transit traffic and savings through economies of scale in customs administration.

5.4 Negotiation outcome

One of the main point of the rules is the breakdown of further negotiations if a state refuses an offer by the agenda-setter. The initial debates about multilateral negotiations in the framework of Article 19 of the Deutsche Bund in 1819 show the breakdown of multilateral negotiations and illustrating Prussian's disbelief in them by arguing that the states are not yet ready to actually enter a system of free trade in Germany (Quote). It also shows that there was no immediate formation of a smaller subset of states. In the sequential framework this requires another differentiation. I assume that the agenda-setter, Prussia, is only making an offer if it is in actual negotiations about a customs union. This implies that diplomatic contacts regarding the possibility does not constitute an offer, but serves for acquisition of information about the required value of the state in question.

5.5 Gobar superadditivity

The concept of global superadditivity, as defined above, basically states that there are gains from the grand coalition, which can be distributed in such a way, that no group of states can achieve a pareto-improvement for its members by breaking away and forming a new coalition.

Dumke's argument about economies of scale can be interpreted as the attempt to show global superadditivity. Kuehne's thesis about the cost of tariff administration demonstrates that those costs decrease relatively speaking, the more states join, the larger the area of the customs union is. Purely looking at administrative costs, global superadditivity exists.

There are however arguments why this story of economies of scale cannot be the sole factor relevant for GC superadditivity. The first is the case of Prussia. As outlined above there are a considerable number of motives influencing Prussian politics. Prussian accounts also show that the net revenue from tariffs actually decrease with the introduction of the Zollverein. Since there is no reason to assume that the economic situation decreased, this indicates that Prussia was in fiscal terms worse off through its membership in the Zollverein. (Quote with numbers). This implies that at least Prussia had another motive valued at least as high as the financial losses (have to check for full impact on budget through other taxes). The other point depends on the motives underlying the tariff policy. If states organize their tariffs with a different goal than pure revenue maximization in mind, for example free

trade which has lower enforcement costs, then the cost savings may not be high enough to outweigh the loss from deviating from the desirable tariff rate to the general customs union rate. I will extend this argument later in the context of coalition externalities.

Grand coalition superadditivity is a sufficient condition for the outcome of free trade, but not a necessary one. As Aghion et al show, the grand coalition can form despite failure of Grand coalition superadditivity, if externalities fulfill certain conditions.

5.6 Choice of negotiation structure

One of the major elements of the bargaining model used is the choice of the negotiation structure by the agendasetter. This choice basically determines whether there will be a multilateral approach to negotiating an agreement or a sequential approach with intermediate blocks. Although the Zollverein had the official starting date of the first of January 1834, was its creation not a result of collective negotiations, but the outcome of individual negotiations between Prussia and the potential member states. Although some of the negotiations were overlapping in time, does the structure resemble a sequential order.

It seems unlikely that Prussia had a complete sequence of negotiations planned out, especially when it begun negotiations with enclaves shortly after the introduction of its new tariff law. However sequential negotiations themselves were a conscious choice. Prussia had the possibility of multilateral negotiations and therefore made its choice for sequential negotiations by rejecting multilateral approach. The topic of a closer commercial integration already came up at the congress of Vienna, which however only decided to defer any tangible negotiations about commercial and trade cooperation to the constituting session of the Deutsche Bund. The Bundestag however never follow through and nothing came out of the initial impetus. The existence of Article 19, which defers those negotiations to the Bundestag, as well as the fact that later on some states petitioned the Bundestag to take up negotiations based on this article shows that multilateral negotiations would have been feasible. Another rejection of the multilateral approach was Prussia's insistence to negotiate only with individual member states of the Mitteldeutscher Verein, rejecting any calls for negotiations with all its members combined. (Haferkorn 1933)

5.7 Coalition externalities

Aghion et al show in their benchmark result, that if superadditivity holds but no coalition externalities exist, the choice between multilateral and sequential negotiations is irrelevant. The outcome of free trade as well as the allocation will be identical. Their analysis then introduces coalition externalities which allows then to derive conclusions about the comparative merits of multilateral and sequential negotiations. They go on to show that the assumption of coalition externalities existing due to the formation of free trade areas is justified due to trade creation and diversion effects. This justification however requires that the government utility function is predominantly concerned with public welfare. Since this might not be a reasonable assumption for early 19th century sovereigns, I will justify introducing coalition externalities by analyzing the effect of coalition formation on certain goals for tariff policy.

5.7.1 Goals of tariff setting

Williamson in his analysis of world tariff setting between 1789 and 1938 distinguishes three different motives, a revenue motive, a strategic tariff motive and a Stolper-Samuelson factor compensation motive. The first is rather self-explanatory, governments set tariffs with the idea to raise revenues to satisfy their budgetary needs. The strategic tariff motive is based on the above outlined theory about strategic tariff setting. In this time period however this concept is more of a mercantilistic argument based on reciprocal market access. The idea is basically that if states change their tariffs, they do so to either elicit reciprocal responses by other countries or do so as a reaction to other states. The third motive concerns the internal political economy of countries. Requiring less organizational structure than the Helpman Grossman approach, which models tariff protection as an outcome of lobbying efforts to the government by unspecified special interests, does this approach rest on a connection between trade and politics shown by the Stolper-Samuelson theorem, which has been described by Rogowski. It connects general influence of sectors, like agriculture or manufacturing, to tariff setting through the change of relative prices by tariff.

5.7.2 Impending coalition externalities

The agenda-setter profits from stronger negative coalition externalities, since the payoff necessary to entice a state to accept an offer of membership is

lower. Obviously those states will try to mitigate coalition externalities, to secure higher payoffs, regardless whether they will join or not. I will first focus on Prussia and the issue of creating negative coalition externalities. Customs unions have an effect on third countries through changes in the trade environment. I therefore analyze possible coalition externalities in the framework of tariff policy as outlined above.

The first point is the effect on tariff revenues. The main externality is the effect of the new coalition on the trade volume of a country. One part is the change in trade routes usage, which reduces transit revenues, the other is actual diversion or prevention of trade, reducing import revenues. For example Frankfurt faced the problem that the accession of almost all its neighbourstates gave an advantage to the fair in the close-by city of Offenbach over the traditional one in Frankfurt. Traders no longer needed to leave and re-enter the Zollverein to access the fair, drawing trade away from Frankfurt. The section about Prussia's motive also illustrated the change in trade routes, with Prussia pushing routes through its own countries, for example the North-South connection along the Elbe and Magdeburg, which hurt other states like Hannover, Braunschweig and Hesse-Cassel. As part of its modernization program Prussia invested heavily into a streetbuilding program in the late 1820's, and as Thimme describes, the selection of routes was strongly influenced by the effect it would have on trade flows through Prussia and neighbouring states. The relevant trade routes are primarily land-routes, since transport on the Rhine, the major river for this purpose, was regulated by a separate agreement according to rules agreed on at the Congress of Vienna.

The second area is strategic trade policy. Given a geographical position, a coalition might be able to close all relevant trade-routes for a third country. This has then the effect that the agenda-setter and its tariff-system can obtain a certain degree of control over the tariff system of the country. The possibility of high transit costs has the similar effect as a high tariff rate of the country itself. This poses problems for states running a low tariff system with the intention to secure market access through reciprocal preferential treatment. It can also go as far as the agenda-setter no longer distinguishing between transit and import treatment of goods destined for the third country. This was the case of Prussia and its enclave policy. Prussia had the intention to save on administrative costs as well as to crack down on smuggling and basically integrated certain independent enclaves into its tariff-system, treating any goods on their way to those enclaves as if they were destined

for the prussian market. This has not only the effect on tariff revenues, but also ramifications in political terms. The power to decide on your own tariff system is one point of political sovereignty, loosing it threatens the political situation of the sovereign. There is in light of the mediatisation process of independent states during the Reichsdeputationshauptschluss and the weak dynastic rights only held up through the congress of Vienna, a real fear that trade policy would only be a first step of being absorbed by Prussia.

The last point is internal political economy. This is the area where Prussia's possibilities are strongly limited. Looking at factor compensation, Prussia used its tariff system as the template for the Zollverein, likely because the government did not want to change its successful compromise between the various internal demands, so the tariffs were basically set and there was not much incentive it could offer internal groups in other states through changes in tariff policy when accepting a new member into its system. The situation of a powerful sovereign also has effects on internal political economy. Influencing the decision of the sovereign becomes highly personal, for example Bavaria tried to influence the internal politics of Hesse-Cassel by bribing the servants of the mistress of the duke (Quote). These are however individual actions and not explicit coalition externalities. To sum up, the extent of coalition externalities influencing tariff policy through changes in the internal political economy is relatively low. Another possible channel of externalities in this direction might be the attempt to change public opinion through influence on the press. Prussia is using its influence on other governments to quell criticism of the Zollverein after it was founded (Gesandtschaftsberichte), I don't know enough yet about influence pre-Zollverein.

The first and second area have a strong geographical component to it. Having the major trade routes going through your territory does not only allow to reap benefits from their economic effects, they also allow to set transit tolls and give political leverage on the states depending on these routes.

The threat of Prussia using its customs administration and street-building program to put pressure on other countries had credible precedence. The enclaves basically lost complete control over their tariffs without being really consulted by Prussia. Also for example the small sovereignties of Waldeck and Lippe-Detmold faced severe punitive actions through the closure of trade routes once their negative reactions to the tariff law in 1818 and other Prussian wishes had angered Prussia (Thimme 1931).

5.7.3 Mitigating coalition externalities

If the agenda-setter chooses sequential bargaining, states which are approached on a part of the sequence obviously have time to find measures to mitigate potential coalition externalities. These measures took two major forms, one is to guarantee unimpeded trade through securing access to trade routes and the second are diplomatic agreements with foreign nations, locking in preferential treatment with regard to market access.

The most prominent case of the first measure is the Mitteldeutscher Handelsverein. It was founded in 1828 as a reaction to the formation of the Prussia-Hesse-Darmstadt and Bavaria-Wuerttemberg Customs unions. It contained many states which were not in one of the two customs unions, with the exception of Baden. The Handelsverein was a compromise between a group of states who sought purely negative measures, making certain that no further state joins one of the two customs union and some who wanted to actually create a third economic union. The negative view prevailed, the main points were unimpeded trade through the memberstates and the creation of an improved road infrastructures. Since this institution was a response to the formation of the Prussia-HD coalition, it's main point was to counter this, therefore does the stated intent show clearly what the coalition externalities through the Prussia coalition formation was. Some of its architects envisioned the Mitteldeutscher Verein as a step to a full trade related union of all german states, securing the rights of the samller states caught inbetween Prussia in the North and Bavaria-Wuerttemberg in the South(Haferkorn 1933). This allows the interpretation of this institution as the attempt to raise the price Prussia has to pay to secure the accession to its customs Union.

Another step some of the nations took was to secure trade agreements with foreign powers to replace loss of Prussian markets as well as to prevent being shut out of the international trading system. It might also have been to use bargaining power as long as there is still some power left.

5.8 Sequencing

5.8.1 Literature

Evenett (Evenett 2004) surveys the literature about the sequences of accession to trade agreements and shows three main approaches. The first is labelled "technocratic entrepreneurship" and sees the sequence as the out-

come of a process driven by a group of technocratic experts. Although there are connections between the administrative officials in various countries, was there no coherent group of disinterested experts before the Zollverein. The second approach is called "Geopolitics and mercantilism", and reflects the strategic trade theory motive introduced above. The sequence is the outcome of political pressure and mercantilistic concerns about market access. Similar to the first approach, is there no explicit formal framework used in the analysis. These concerns play a role in the sequence of the Zollverein, does this approach neglect the role of relevant geographical and financial factors. The third idea is the so-called "Domino Regionalism". Formalized by Baldwin (Baldwin 1994), an idiosyncratic event changes the internal political economy within one state, which then joins the trade agreement. The resulting trade creation and diversion effects then cause political economy changes in another country, causing it to join up as well. Rieder (2006) conducts an empirical case study for Europe after WWII based on this approach. The problem with this approach is the neglect of political factors, which were clearly important in the case of the Zollverein. There is also the problem of the starting event to set off the first domino, as well as the question of supply of membership to customs unions. Another problem is the relative importance of tariff revenues and trade creation/diversion effects in the first half of the 19th century in Germany.

5.8.2 Optimal Sequence

If the agenda-setter chooses to follow a sequential path, it also has to make a decision about the sequence in which it makes offers to follower countries. So given a number of $M=N-1$ follower countries, there are $M!$ possible sequences. The agenda-setter optimizes its payoff through the choice of the sequence. To do that it has to maximize negative coalition externalities (and minimize positive coalition externalities) on states which have'tyet joined the coalition. If there are no coalition externalities, all sequences result in the same outcome, making the agenda-setter indifferent about them.

Let S_i be the coalition which has formed after i states have accepted the offers of the agenda-setter, who is following the sequence S to make its offers. So S_i is simply the coalition of the agenda-setter and the first i states in the sequence S . Let $i(S)$ denote the i^{th} state in the sequence S and let Ω denote the set of all possible sequences S . The agenda-setter chooses sequence

$$S^* = \operatorname{argmin}_{S \in \Omega} \sum_{i=1}^M W_{S_{i-1}}(i(S))$$

As a further step I think about actually quantifying it, but not sure yet how to go about it.

For now I deduce two regularities holding for the optimal sequence:

The agenda-setter will choose to make offers to state who have an impact on others but are relatively less affected by others relatively early in the sequence

As well as:

If two states have only an impact on each other, the agenda-setter will pick that state first which has the stronger negative impact on the other

5.8.3 Zollverein Sequence

After some successes with regard to enclaves, the treaty with HD was the first customs treaty of Prussia which involved sharing control over customs policy. HD profited considerably, alleviating its considerable financial trouble. Prussia's benefit is less obvious, HD did not connect the two Prussian territories, had no major trade route going through its territory, had only a small border with Prussia and the revenue sharing agreement results in considerable financial transfers from Prussia to HD. However the agreement had two political effects, it put pressure on the other hessian principality, especially Hesse-Cassel, as well as served as a hindrance to expansion plans of the Bavarian-Wuerttemberg customs union. Following the formation of the Mitteldeutscher Handelsverein, the two customs union (Prussia-HD and Bavaria-Wuerttemberg) concluded a first trade agreement in 1829, which was accompanied by a street-building program, enhancing the connections of Southern Germany to the North. HC had strategically strong geographical location, controlling the traditional North-South routes, as well as the East-West connection between the major trade fairs in Frankfurt and Leipzig, and contained a direct route between the two major prussian territories. The stronger tariff borders of its direct neighbor HD as well as threat of losing transit traffic to other states convinced in 1831 the sovereign of HC, who

had come to power only a short time ago, in 1831 to defect from the Mitteldeutschen Handelsverein and join the Prussian tariff system. This move increases the pressure on Bavaria and Wuerttemberg, who were negatively affected by increased transit tariffs through HC. This led to continued negotiations between the two customs unions, which were concluded in March 1833. A possible unification between the two unions led to the fear of complete isolation in Saxony and some of the thuringian principalities. This had already become evident when Saxony and Saxony-Weimar insisted on a separate article in a second treaty of the Mitteldeutscher Handelsverein in 1829, which allowed them to end their membership early should the two customs unions merge within the next years. Once the two unions finalized their negotiations, Saxony agreed to join as well. Two months later another agreement was reached with the otherwise completely isolated thuringian principalities. The unification also left Baden completely isolated. Due to its geographic location, which included the major trade route between France, Switzerland and the other German states, it was profiting from transit traffic. The fear of isolation and its effect on trade as well as the large market of the Zollverein led to negotiations and the accession into the Zollverein. Nassau was running a mildly successful tariff system, especially due to certain tolls on the Rhine (Hahn 1982), so for a long time its politics towards Prussia was relatively hostile. The prospect of being completely surrounded by the Prussian-led Zollverein however led to a reversal and the conclusion of an accession treaty in December 1835. At the same time as Nassau, also Frankfurt was negotiating for its membership. The city already suffered through the Zollverein, since its importance as a trading city was undermined by the fair in the neighboring city of Offenbach, which was located in the Zollverein. Once Nassau joined Frankfurt lost its last unimpeded access to the Rhine and was completely isolated, leading to a speedy conclusion of its own negotiations. In contrast to Southern German states, did their Northern counterparts not face the threat of being isolated. This led Braunschweig and Hannover to conclude their own customs union in 1834, which was joined by Oldenburg in 1836. Seeing the large market of the Zollverein. The almost finished negotiations about the renewal of the Steuerverein in 1841 fell apart due to differences between Hannover and Braunschweig about the route of a new street, which would have caused traffic through Braunschweig to decrease significantly. To avoid isolation Braunschweig turned to Prussia and joined the Zollverein in 1842. Hannover finally joined in 1854, however by then the Zollverein had turned into an arena for the political

struggle between Prussia, Austria and the other German states, leading to different contexts for their membership.

To characterise the sequence in terms of the two rules derived above, the offer to HD followed the first rule, asking a state which on which Prussia could not exert much more externalities. Similar the admission of HC, whose membership had a strong effect on others. The unification with Bavaria and Württemberg also followed Rule one, since those were two states for which further externalities were hard to find. The sequence of Saxony before Thuringia followed Rule two, the same for Nassau and Frankfurt. Baden, as well as Braunschweig, are cases

6 Conclusion

The main argument of Dumke's hypothesis is that fiscal revenues derived from economies of scale are sufficient to guarantee superadditivity. This argument has the main problem that it cannot explain that northern German states, which would have profited as well, did not join the Zollverein for a considerable time or at all without being annexed by Prussia. The Hanse towns of Bremen and Hamburg didn't till the 1880's. Acknowledging the importance of financial revenues, predominantly generated through economies of scale in customs administration, an additional explanation is required to explain why these revenues seem to suffice for some states but not others. The existence of coalition externalities can explain how states were convinced to join. Those externalities lower the reservation value of states, which explains the initial negative reaction of many states. Through the attempts to mitigate those externalities, especially the Mitteldeutsche Handelsverein, states attempted to increase their reservation value and therefore their payoff of an eventual membership.

The identified coalition externalities can explain the observed sequence of accession to the Zollverein. They have a strong geographical component through the importance of trade routes on the fiscal and economic condition of states and their rulers.

One of the debates in modern trade theory is the question of regionalism and the role of Regional trade agreements for the attainment of global free trade. My case study of the Zollverein shows regional agreements can be stepping stones, since they allow the agenda-setter to lower the threshold for states through the exertion of coalition externalities. However since coalition ex-

ternalities cause reactions by affected states, can regional trade agreements become stumbling blocks if their predominant goal is to mitigate coalition externalities. So if open and intended to further enlargement, coalitions have a positive, while if closed and defensive they have a negative effect on the goal of free trade.

Prussia and the Zollverein show a case where the agenda-setter had sufficient leverage to create large coalition externalities to overcome most mitigating attempts. These possibilities were predominantly the result of the geographical location of states as well as major trade routes. The observed sequence is the outcome of an optimization process of the agenda-setter in his attempt to form a grand coalition.

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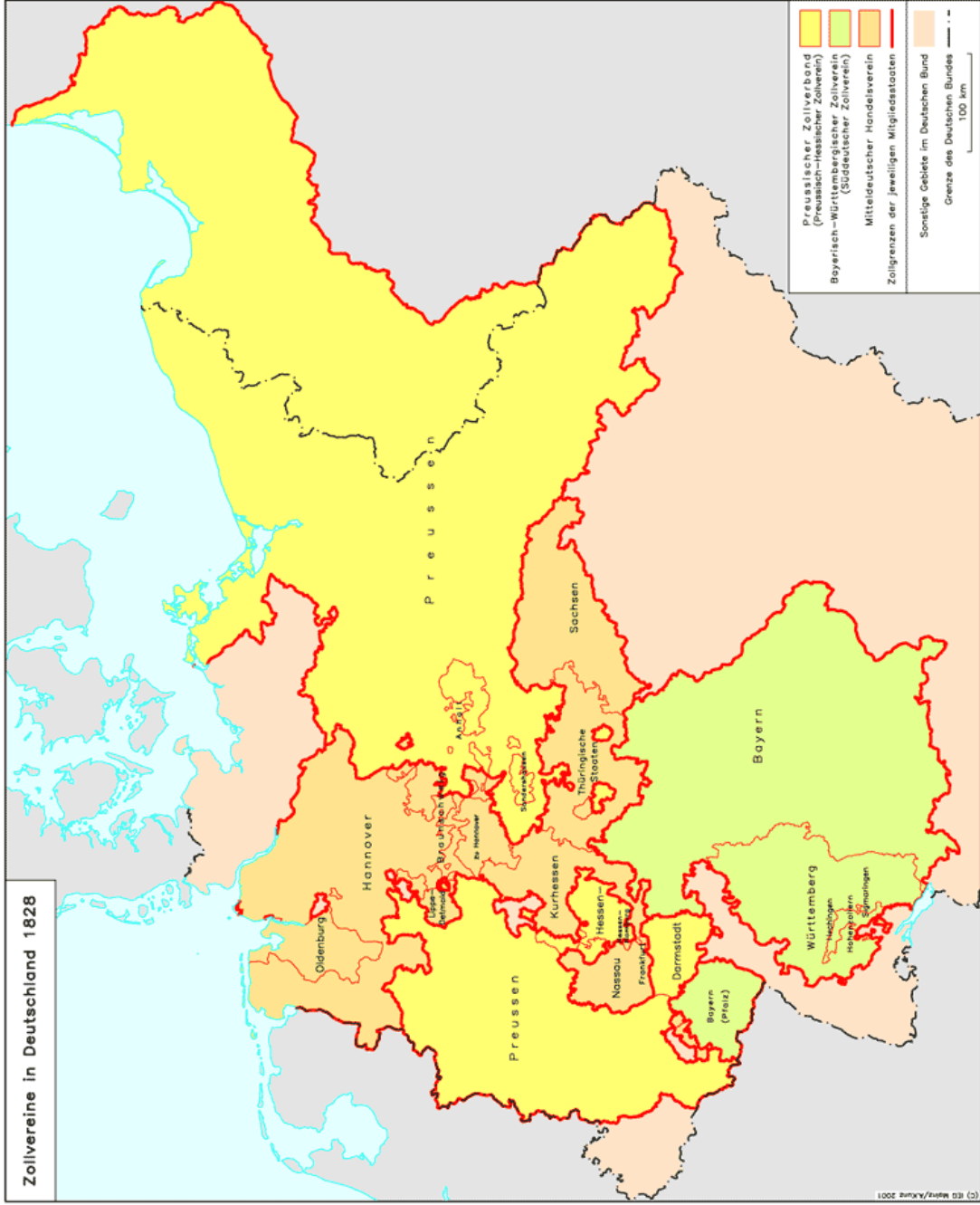
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Time line

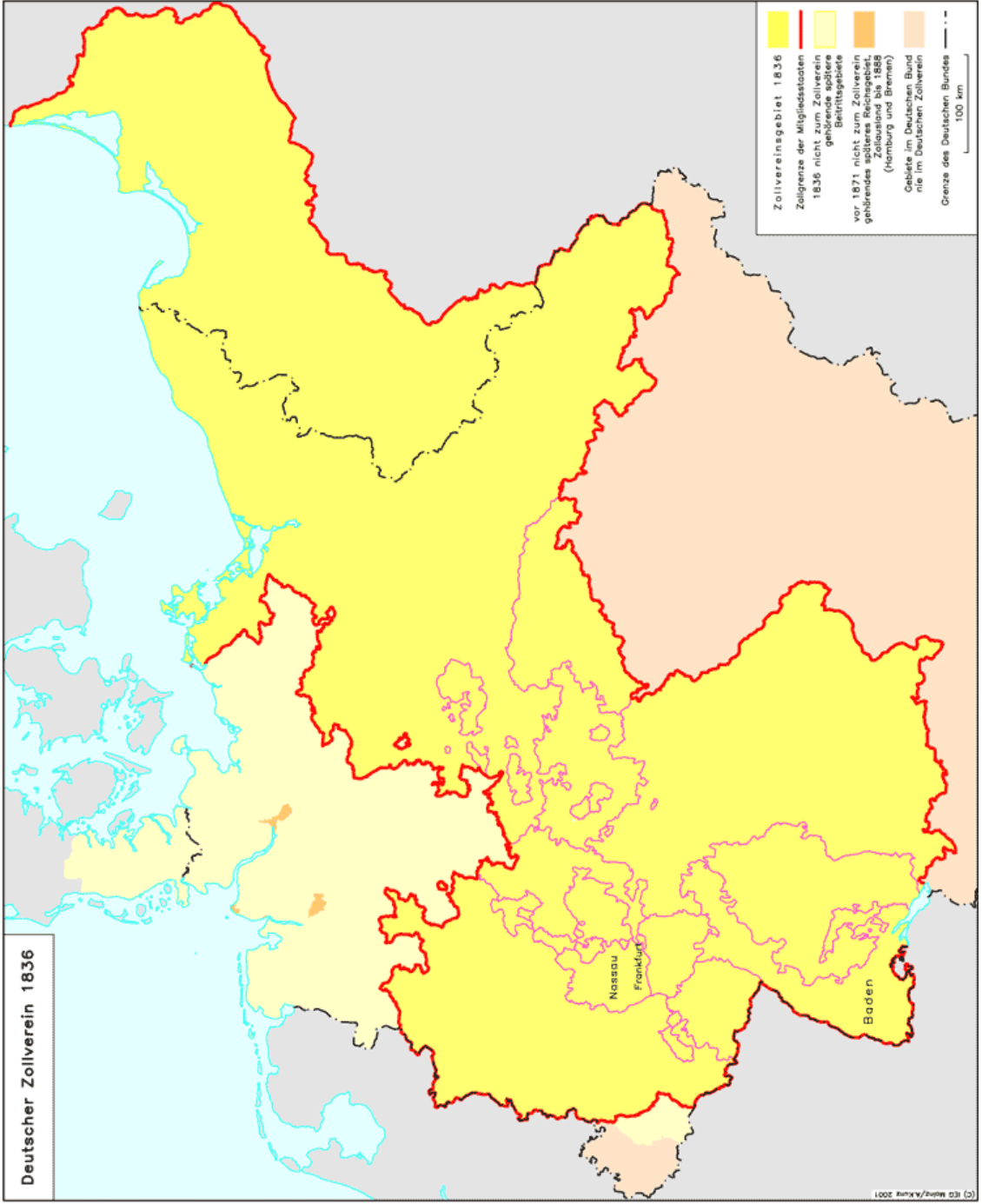
Treaty Signatures

Hessen-Darmstadt	14.02.1828	Baden	12.05.1835
Hessen-Kassel	25.08.1831	Nassau	10.12.1835
Bayern	22.03.1833	Frankfurt	02.01.1836
Wuerttemberg	22.03.1833		
Sachsen	30.03.1833	Braunschweig	19.10.1841
Thueringen	10.05.1833	Hannover	07.09.1851

1828, after formation of the two customs unions and the Mitteldeutsche Handelsverein



1836, The Zollverein



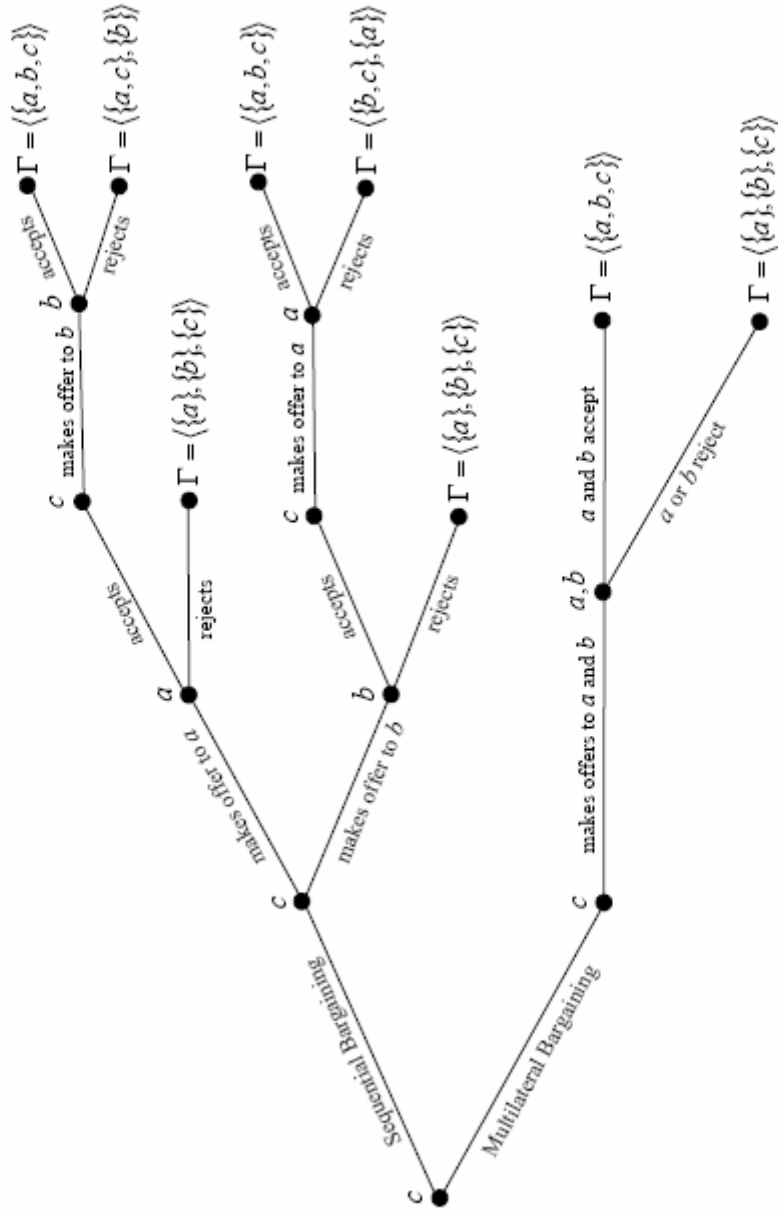


Figure 1: Game tree